

# Standards

Keeping everyone together

# What is a Standard

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- Using the same protocols as each other
- Enabling interoperability between equipment
- Different manufacturers' hardware can work together
- (most of) you have seen web standards already
  - W3C

# Why have them?

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- So that things fit together properly
- Health and safety (e.g. consider the power of a microwave transmitter)
- Encourage competition (consider Microsoft Office proprietary formats)

# What do standards cover?

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- shoe sizes and clothing sizes
- nuts, bolts, screws
- weights and measures
- the time
- radio and television transmission, VCR formats
- layout of pedals in a car
- telephone handsets
- programming languages
- and so on



# Types of standard (1)

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- *de jure* standards are standards that are laid down by a recognised standards-making body. Note that this does not mean that they necessarily have the force of law
- *de facto* standards are standards that are accepted and complied with by general consent but have no formal authority

# Types of standard (2)

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- Full international standards promulgated by ISO or ITU-T are free standing and do not depend on other standards. They are sometimes known as *base* standards
- <http://www.iso.org/>
  - Want a laugh? Click [here](#).
- <http://www.itu.int/home/>

# Types of standard (3)

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- Base standards often allow too many different options to be directly useful (e.g. Cobol or RS232).
- Particular countries, regions or industry sectors may produce specific interpretations of base standards, which are known as *functional* standards.

# Enforcement

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- There is no general mechanism for enforcing standards.
- If you claim your product meets a standard when it doesn't, your customers can take action against you in court and so, in some cases, can the body that promulgated the standard.
- In certain areas (e.g. telecommunications, aviation, pharmaceuticals), regulatory bodies may enforce standards.
- Regulatory bodies are not standards-making bodies.



# Standards in computing

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- programming languages
- documentation
- software interworking (open systems standards)
- hardware interconnection (e.g. the PC)
- quality management
- telecommunications

# Who develops standards?

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- national standards organisations
- international organisations
- professional bodies
- industry associations
- individual manufacturers
- major customers

# National standards bodies

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- What standards have you heard of?
- British Standards Institute (BSI)
  - BS5750 (now ISO 9000) - the standard for quality management systems, standard for Pascal, etc
- American National Standards Institute (ANSI)
  - ASCII, standards for C, Cobol, Fortran, etc
- Deutsches Institut für Normung (DIN)
  - best known in the UK for its standards for plugs for audio systems.
- Singapore Productivity and Quality Board

# International organisations (1)

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- International Organisation for Standardisation (ISO)
- ETSI (European Telecommunications Standards Institute)
- International Telecommunications Union - Telecommunication Standards Sector (ITU-T), formerly CCITT.
- (more on these later...)



# International organisations (2)

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- ECMA (originally European Computer Manufacturers Association)
  - <http://www.ecma-international.org/>
  - *“Ecma International is an industry association founded in 1961, dedicated to the standardization of information and communication systems.”*
- CEN (Comité européen de normalisation)
  - <http://www.cen.eu/>
  - *“... promotes voluntary technical harmonization in Europe ... conformity assessment...”*

# Professional bodies

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- Institute of Electrical and Electronics Engineers (IEEE) - runs Project 802, which sets standards for the first two layers of the OSI model (and part of the third) for local area networks.
- What's the OSI?  
[http://www.webopedia.com/quick\\_ref/OSI\\_Layers.asp](http://www.webopedia.com/quick_ref/OSI_Layers.asp)  
(basically a framework for implementing protocols over a network)

# Associations of suppliers

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- Electronic Industries Association (USA) - sets physical standards for such things as twisted pairs or the interface between a DTE (Data Terminal Equipment) and a DCE (Data Communications Equipment) (EIA-232, originally RS-232)
- Frame Relay Forum
  - a protocol standard for LAN:  
<http://www.protocols.com/pbook/frame/>



# Individual suppliers

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- Sun Microsystems (now Oracle) ‘own’ the Java standard (so Sun could sue for breach of the standards – and did: see [here](#))
- Centronics standard for parallel printer interfaces
- VT100 terminal interface developed by DEC (Digital Equipment Corporation, now part of Compaq/HP)



# ISO

## International Organization for Standardization

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- Members are mainly national standards bodies.
- Usually adopts as international standards, standards proposed by the national standards bodies, e.g. the standards for programming languages - Fortran, Cobol, Pascal, Ada, C, etc.
- Most important output (as far as we are concerned) is the Open Systems Interconnection (OSI) Model for networking protocols, ISO 7498.
- ISO 9000 (originally BS5750) is a very important standard for quality management systems.
- ISO standards have to be reviewed every five years.
- Web site: <http://www.iso.org/>

# ITU-T

## International Telecommunication Union

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- was called CCITT (*Comité Consultatif International Téléphonique et Télégraphique*) before 1993
- voting members: telecommunications administrations from the participating countries often, the National PTTs (Post, Telephone and Telegraph authorities)
- other scientific and industrial members and also some international user organisations
- V-series standards for modems; X-series standards for transmission over public digital networks, e-mail and directory services; ISDN standards
- web site: <http://www.itu.int/ITU-T/>

# ETSI

European Telecommunications Standards Institute

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- officially responsible for standardization of Information and Communication Technologies (ICT) within Europe
- Members are organisations (manufacturers, service providers, government bodies)
- Produces functional standards for use in Europe
- Submits proposals to ITU-T
- Web site: <http://www.etsi.org/>



# Problems with standards

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- *De jure* standards take a long time to produce.
- Standards have to cover all eventualities and may therefore allow too much freedom (e.g. Cobol, RS232).
- Who owns the intellectual property rights?
- A good way of preserving the mistakes of the past (e.g. PC architecture).



# Open systems standards

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- Up to the early 1980s, users were locked into particular manufacturers because of proprietary standards.
- ‘Open standards’ liberate users from this situation.
- They are just standards.
- Usually mean UNIX, SQL, CORBA<sup>\*</sup>, etc.

# Mobile telephony: 2<sup>nd</sup> generation

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Second generation standards (1990 to present):

- PDC (Personal Digital Cellular) and PHS (Personal Handyphone System), used mostly in Japan;
- AMPS (Advanced Mobile Phone Service), D-AMPS (Digital-AMPS) and IS-95, used principally on the American continent and in Asia;
- GSM (Global System for Mobile communication), mainly in Europe but also in America and Asia.

# Mobile telephony: 3<sup>rd</sup> generation

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Developed through the ITU-T IMT-2000 project:

- UMTS (Universal Mobile Telephone System) developed by 3GPP project (<http://www.3gpp.org/>)
- **cdma2000** developed by 3GPP2 project (<http://www.3gpp2.org/>) (see also **cdma**)

These are standards developed by industrial consortia with the support of the ITU-T. Two proved necessary to facilitate migration from older systems.



# ISOC

## The Internet Society

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- <http://www.isoc.org/>
- an international organisation, founded 1/1992
- addresses issues concerning future of the internet
  - social, political, and technical
- has individual and organisational members;
- managed by a Board of Trustees elected by the worldwide individual membership
- administers standards, raises funds, runs conferences and workshops
- anyone can join



# ISOC groups

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- Internet Architecture Board (IAB)
- Internet Engineering Task Force (IETF)
- Internet Engineering Steering Group (IESG)
- Internet Assigned Numbers Authority (IANA)
- Internet Research Task Force (IRTF)

Following...

# IAB

## Internet Architecture Board

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- set up by the ISOC trustees to provide oversight of the architecture of the Internet and its protocols;
- appoints the IETF chair and is responsible for approving other IESG candidates put forward by the IETF nominating committee;
- reviews and approves the terms of reference of new Working Groups that are proposed for the IETF;
- oversees the process used to create Internet standards;
- advises the IETF and the ISOC on technical, architectural, procedural, and policy matters.

# IETF

## Internet Engineering Task Force

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- identifies operational and technical problems in the Internet and proposes solutions to such problems
- makes recommendations to the Internet Engineering Steering Group (IESG) regarding the standardization of protocols and protocol usage;
- helps technology transfer from the Internet Research Task Force (IRTF);
- provides a forum for the exchange of information within the Internet community



# IETF structure

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- no membership - anyone may attend any meeting;
- three meetings a year;
- working groups are set up to address particular topics and operate mostly by e-mail;
- anyone can subscribe to a working group mailing list and thus participate in its activities



# Operation of IETF Working Groups

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- working groups have chairmen whose job it is to make sure the group does what it's supposed to, particularly with respect to its role in the Internet standards process;
- chairman is the formal point of contact with the IESG, through the IETF Area Director;
- groups usually focus on producing a specific document;
- the group appoints an editor (different from the chair) whose job it is to make sure the document accurately reflects the group's decisions.

# Requests for Comments (RFC)

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Series of ISOC (Internet Society) publications of high standard, of different types:

- informational
  - best current practice
  - experimental
  - proposed standard.
- Latest is (Feb 29<sup>th</sup> 2016): RFC7803
  - "A Roadmap for Transmission Control Protocol (TCP) Specification Documents", February 2016.

<https://www.rfc-editor.org/info/rfc7803>

# IESG

## Internet Engineering Steering Group

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- responsible for the management of the IETF technical activities
- administers the Internet Standards process
- responsible for the actions associated with the progression of technical specification along the "standards track" including the initial approval of new Working Groups and the final approval of specifications as Internet Standards
- composed of the IETF Area Directors and the chair of the IETF, who also serves as the chair of the IESG



# IANA

## Internet Assigned Numbers Authority

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Many protocol specifications include numbers, keywords, and other parameters that must be uniquely assigned. IANA is responsible for:

- assigning the values of these protocol parameters for the Internet
- publishing tables of all currently assigned numbers and parameters
- "top of the pyramid" for DNS and Internet address assignment establishing policies for these functions
- Operated by ICANN (Internet Corporation for Assigned Names and Numbers )
- Independent... supposedly. Google on .xxx domain row!



# IRTF

## Internet Research Task Force

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- not directly involved in the Internet standards process;
- concerns itself with things that are not sufficiently well understood to be considered for standardisation;
- if it comes up with something stable enough to be considered for standardisation, it hands it over to the IETF;
- operates through working groups in a similar way to the IETF, but less formally;
- overseen by the Internet Research Steering Group (IRSG).

# OASIS

Organization for the Advancement of Structured Information Standards

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- From <http://www.oasis-open.org/> :
- drives the development, convergence, and adoption of e-business standards.
- produces more Web services standards than any other organisation